

**Mathematics: The Language of STEM**  
**Problem-Based Lesson Plan Format**

**Description of the Task:**

Students will learn about volume so that in the end, they can design their own box (rectangular prism) for a specific volume.

**Mathematics Content Objectives:**

5.M.4 Find the volume of a right rectangular prism with whole-number side lengths

**Language Objectives:**

Discuss the reason why different shaped rectangular prisms can have the same volume.

<b>Student Actions</b>	<b>Teacher Actions</b>
<p><u>Before (Launch)</u></p> <p>Students will discuss the concept of volume. They will discuss similarities and differences between 2D rectangles and 3D rectangular prisms. They will identify real life examples of measuring volume.</p> <p>Students will estimate volume by ordering boxes from least to greatest volume.</p> <p>Once estimates are recorded, students will discuss ways to “prove” their estimates.</p>	<p><u>Before (Launch)</u></p> <p>Teacher will lead students in a conversation about rectangular prisms.</p> <p>Teacher will ask students to compare and contrast 2-D area and 3-D volume.</p> <p>Teacher will pose the question “What is the relationship of box size and volume?”</p> <p>Teacher introduces the <b>focus question</b>: What are some ways we could measure the space inside? (First focus on nonstandard units)</p>
<p><u>During (Explore)</u></p> <p>Students will use a nonstandard unit (example- packing peanuts or marshmallows) to measure the volume of the boxes.</p> <p>Students will identify Pros and Cons to using nonstandard units in measuring volume.</p> <p>Students will switch tools and measure volume using 1 inch (or 1 cm) cubes. Once completed they will discuss PROs and CONS</p> <p>After these two activities, students will discuss ideas for a formula to help find area</p>	<p><u>During (Explore)</u></p> <p>Teacher will formatively assess student progress throughout the explore phase. The teacher will ask student productive questions being careful to avoid funneling students.</p> <p>Questions:  What are some Pros and Cons to using packing peanuts to measure volume?  How could we be more accurate in measurement of volume?</p>

<p>of a rectangular prism.</p> <p>Once students have a formula for volume they will practice on the original boxes from the launch activity.</p> <p>As a final challenge, students will attempt to build a box to hold a specific volume.</p>	<p>Teacher will challenge students to think about volume in reverse. Asking:</p> <p>I have 144 cubic inches of _____. Can you build me the smallest box that will hold all of my _____?</p>
<p>After (Summarize)</p> <p>Students will brainstorm real life examples when volume would need to be calculated.</p> <p>The whole class will discuss the question; How is it possible different shaped rectangular prisms have the same volume?</p>	<p>After (Summarize)</p> <p>Teacher will ask some questions to get the students talking to each other in a final group discussion:</p> <p>What are some real life examples in which someone would need to calculate area?</p> <p>How is it possible different shaped rectangular prisms have the same volume?</p>